

## PROJECT FACT SHEET

**CONTRACT TITLE:** Real-Time, Near-Term Field In-Situ Characterization of Metals in Gas and Aerosol Phases for the Development of a New Source Identification Model (PARTNERSHIP)

**ID NUMBER:** P-54 (FEAC313) **CONTRACTOR:** Oak Ridge National Laboratory

**B&R CODE:** AC1015000

**ADDR:** P.O. Box 2008  
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**DOE PROJECT MANAGER:**

**CONTRACT PROJECT MANAGER:**

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**PROJECT SITE**

**CITY:** Oak Ridge **STATE:** TN  
**CITY:** **STATE:**  
**CITY:** **STATE:**

**CONTRACT PERFORMANCE PERIOD:**  
1/15/1999 to 3/14/2002

**PROGRAM:** Environmental-Oil  
**RESEARCH AREA:** Process; Environmental  
**PRODUCT LINE:** EEP

**CO-PARTICIPANTS:**

<b>PERFORMER:</b>	<b>CITY:</b>	<b>STATE:</b>	<b>CD:</b>
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<b>PERFORMER:</b>	<b>CITY:</b>	<b>STATE:</b>	<b>CD:</b>

FUNDING (1000'S)	DOE	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	430	85	515
FY 2002 CURRENT OBLIGATIONS	0	0	0
FUTURE FUNDS	0	0	0
TOTAL EST'D FUNDS	430	85	515

**OBJECTIVE:** Develop and explore the measurement capability of a laser-induced plasma spectrometer (LIPS) to detect metals in-situ and in real-time in the airborne particulate matter and gas phases if they exist.

**PROJECT DESCRIPTION:**

**Background:** A new air quality standard for airborne particulate matter (PM) of aerodynamic size equal to or smaller than 2.5  $\mu\text{m}$  was issued by the US Environmental Protection Agency in July 1997. This fraction of PM is called PM 2.5 or the fine fraction. The new standards are an annual arithmetic mean of 15  $\mu\text{g}/\text{m}^3$ , and a 24-hr maximum of 65  $\mu\text{g}/\text{m}^3$ , which indicates a three-year average of 98th percentile spatially averaged across area. The rationale of a new PM standard is that this would protect human health better than larger ones do that are regulated by existing standards. Fine particles could penetrate deeper into human lungs and were found to cause tissue inflammation and damage respiratory/pulmonary functions. The toxic chemicals carried by particles can be released more rapidly after they deposit at the inner tissue than at the upper airway. The exact mechanisms of particle toxicity and the cause-effect relationship to PM2.5 mortality problem are however far from unclear. The fundamental chemistry and physics of the formation of PM2.5 from the precursor gases and ultra-fine particles are far from clear.

**Work to be Performed:** The goal of this research is to develop and explore the measurement capability of a laser-induced plasma spectrometer (LIPS) to detect metals in-situ and in real-time in the airborne particulate matter and gas phase if they exist. This instrument will be able to differentiate the metals in the particulate matter from phase if they exist. This instrument will be able to differentiate the metals in the particulate matter from those in the gas phase. Advances of fundamental chemistry of atmospheric particulate matter rely on the ability to measure key chemical species as a function of particle size. The information regarding the chemical composition as a function of particle size for airborne particulate matter of 2.5  $\mu\text{m}$  and smaller is limited. Such information does not even exist for the ultra-fine particles. Field experiments will be conducted to evaluate the performance of this spectrometer and to characterize elemental composition of airborne particulate matter as a function of their particle size.

**PROJECT STATUS:**

**Current Work:** Work is on schedule with the following milestones

**Scheduled Milestones:**

Generate aerosol and diagnostics	09/99
Develop particle sizing module	04/00
Fabricate particle experiment cell and flow diagnostics	08/00
Metals and fine particle characterization	02/01
Measurements of ambient samples	08/01

**Accomplishments:****TECHNOLOGY TRANSFER:**

**Technology/Information Transfer:**

**Public Relations:**

Updated By:

Date: